

# **COUPLING STRUCTURE FOR TANDEM MOTOR**

## **BACKGROUND OF THE INVENTION**

### **A. Field of the invention**

5   **[0001]**     The invention relates to a coupling structure for a tandem motor and, more particularly, to a coupling structure including an elastic fastener fit in the tandem motor.

### **B. Description of the related art**

10   **[0002]**     When several fans are combined to generate a large amount of air quantity, the method for directly connecting separate fan housings is generally considered. However, this may need a lot of connection pieces and corresponding joints, making the assembling process complicated and resulting in a high cost. In addition, the reliability of the joints tends to decay because of the continuous vibration, and the connection strength of the whole assembly is deteriorated as a  
15   result.

## **BRIEF SUMMARY OF THE INVENTION**

**[0003]**     Therefore, an object of the invention is to provide a coupling structure for a tandem motor to serially couple separate fan motors at a low cost, simplified process, and sufficient connection strength.

20   **[0004]**     According to the design of the invention, a coupling structure for a tandem motor includes two bearing sleeves each formed with a groove, a connector and two elastic fasteners. The connector is also formed with two grooves at opposite ends, and the elastic fastener may be a C-shaped retaining ring with an inner edge and an outer edge. Two fan motors can be serially coupled through the  
25   connection of the elastic fastener and the two bearing sleeves, with one portion of the elastic fastener fit into the groove on the connector while the remainder received in the groove on the bearing sleeve.

**[0005]** Alternatively, the connector may be directly formed on one bearing sleeve as a connection part, and the connection part may have bevel-shaped or conical-shaped surfaces served as guiding surfaces for the coupling process of the two bearing sleeves.

5 **[0006]** Through the design of the invention, the connection of the two bearing sleeves can be easily achieved by the elastic fastener to serially couple separate fan motors, and thus separate fans are combined at a low cost, simplified process, and sufficient connection strength.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

10 **[0007]** FIG. 1 is a perspective view showing a coupling structure for a tandem motor according to an embodiment of the invention.

**[0008]** FIG. 2 is a schematically sectional view showing a connector according to an embodiment of the invention.

15 **[0009]** FIG. 3 is a top view showing a C-shaped retaining ring according to an embodiment of the invention.

**[0010]** FIG. 4A is a schematically sectional view showing a combination of two fan motors according to an embodiment of the invention.

**[0011]** FIG. 4B is a partially enlarged view M of FIG. 4A.

20 **[0012]** FIG. 5 is a perspective view showing a coupling structure for a tandem motor according to another embodiment of the invention.

**[0013]** FIG. 6 is a cross-sectional view showing a bearing sleeve formed with a connection part according to another embodiment of the invention.

**[0014]** FIG. 7A is a schematically sectional view showing a combination of two fan motors according to another embodiment of the invention.

25 **[0015]** FIG. 7B is a partially enlarged view N of FIG. 7A.

**[0016]** FIG. 8A is a schematically view showing a modification of a bearing

sleeve.

**[0017]** FIG. 8B is a schematically sectional view showing a modification of a connector.

### **DETAILED DESCRIPTION OF THE INVENTION**

5 **[0018]** FIG. 1 is a perspective view showing a coupling structure 10 for a tandem motor according to an embodiment of the invention. Referring to FIG. 1, the coupling structure 10 for the tandem motor includes two bearing sleeves 12, a connector 14 and two C-shaped retaining rings (C-rings) 16. The bearing sleeves 12 are inherent parts of fan motors (not shown) that are to be serially coupled. The  
10 bearing sleeves 12 may be made of metal, such as copper, or engineering plastics. Each of the bearing sleeves 12 is formed with a ring-shaped groove 18 on its inner surface, with the ring-shaped groove 18 keeping a predetermined distance from the end surface P of the bearing sleeve 12.

**[0019]** FIG. 2 is a schematically sectional view showing the connector 14 of the  
15 invention. As shown in FIG. 2, the connector 14 is formed with two ring-shaped grooves 20 at opposite ends, and that portion having a thickness d between two ring-shaped grooves 20 is formed with two leading edges at its upper and lower ends to create inclined guiding surfaces 22.

**[0020]** Referring to FIG. 3, the C-ring 16 used in this embodiment is a  
20 ring-shaped resilient member having an inner edge 16a, an outer edge 16b and an opening. When an external force is applied to the C-ring 16, it may extend outwardly or shrank inwardly; once removed, it recovers original shape through its inherent resilience.

**[0021]** FIG. 4A is a schematically sectional view showing a combination of two  
25 fan motors 40, and FIG. 4B is a partially enlarged view M of FIG. 4A. Referring to FIG. 4B, first, the thickness d between the two grooves 20 of the connector 14 is designed to equal a sum of two predetermined distances, each measured from the groove 18 to the end surfaces P of the bearing sleeve 12. Hence, when the inner

edges 16a of the two C-rings 16 are fit into the ring-shaped grooves 20 at opposite ends of the connector 14, and the outer edges 16b of them are received in the ring-shaped grooves 18 of the two bearing sleeves 12, the two fan motors 40 are serially coupled.

5 [0022] Through the design of the invention, it is quite simple to form a tandem motor by the C-rings 16 engaged with grooves both on each bearing sleeves 12 and the connector 14, thus simplifying the assembling process and reducing the cost for serially coupling the fan motors. In addition, the joints of the fan motors to be coupled are concentrated on the C-rings 16 to enhance the connection strength of  
10 the tandem motor. Therefore, through the invention, separate fans are combined at a low cost, simplified process, and sufficient connection strength.

[0023] FIG. 5 is a perspective view showing a coupling structure for a tandem motor according to another embodiment of the invention. Referring to FIG. 5, the coupling structure 30 for a tandem motor includes a bearing sleeve 12a, bearing  
15 sleeve 12b and C-ring 16. The bearing sleeves 12a and 12b are inherent parts of the fan motors (not shown) that are to be serially coupled. A ring-shaped groove 18b is formed on the inner surface of the bearing sleeve 12b, keeping a predetermined distance from the end surface Q1 of the bearing sleeve 12b.

[0024] Referring to FIG. 6, the bearing sleeve 12a is particularly formed with a  
20 connection part 24 at one end thereof, and a ring-shaped groove 18a is formed on the outer surface of the connection part 24 at a distance from the end surface Q2 of the connection part 24. Also, the connection part 24 is formed with a leading edge 22 to create an inclined guiding surface 22. According to this embodiment, the height d1 of the guiding surface 22 is configured to equal the predetermined  
25 distance measured from the groove 18b of the bearing sleeve 12b to the end surface Q1.

[0025] FIG. 7A is a schematically sectional view showing the combination of two fan motors 40, and FIG. 7B is a partially enlarged view N of FIG. 7A. As shown in FIG. 7B, the height d1 of the guiding surface 22 is configured to equal the

predetermined distance measured from the groove 18b to the end surface Q1. Hence, when the inner edge 16a of the C-ring 16 is fit into the groove 18a of the connection part 24 of the bearing sleeve 12a and the outer edge 16b of it is received in the ring-shaped groove 18b of the bearing sleeve 12b, the two fan  
5 motors 40 are serially coupled.

**[0026]** According to this embodiment, the two motors 40 are serially coupled by the C-ring 16 and the connection part 24, a substitute for the separate connector 14, with the connection part 24 integrally formed on one of the bearing sleeves. Also, it can be understood that such way of forming an connection part well suits the case  
10 that the two bearing sleeves to be coupled have a different wall thickness, and we have only to integrally form the connection part 24 on the bearing sleeve having larger wall thickness.

**[0027]** As described above, since the positions of the grooves formed on both the connector and the bearing sleeves may be selected arbitrarily, the design of the  
15 invention is easy to apply to various kinds of fan motors when the shape of the connector is well defined.

**[0028]** Further, the elastic fastener used in this invention is not limited to a C-ring, but may be any resilient members capable of fitting into corresponding grooves. Preferably, the resilient member is configured as a ring shape to match  
20 with the profile of the ring-shaped bearing sleeve so as to provide more contact areas.

**[0029]** In addition, as shown in FIGS. 8A and 8B, the number of the grooves 18 formed on each bearing sleeve 12 and the grooves 20 on each side of the connector 14 is not restricted to one. Instead, a plurality of grooves may be formed  
25 to allow the selection of positions where the elastic fastener is engaged. Besides, the number of the elastic fasteners is not restricted, and can be determined according to the number of the grooves and the desired connection strength.

**[0030]** While the invention has been described by way of examples and in

terms of preferred embodiments, it is to be understood that the invention is not limited to the disclosed embodiments. To the contrary, it is intended to cover various modifications. Therefore, the scope of the appended claims should be accorded the broadest interpretation so as to encompass all such modifications.